Change History:

Date	Version	Change Item	Author
2023/7/28	V1.0	First release.	John Ruan

M1P-1200-200E

All Silicon Carbide Power Module

1200V/200A 62mm SiC MOSFET Power Module

Features

- Low $R_{DS(on)}$
- Low surge, low switching loss
- High-speed switching possible
- Halogen Free, RoHS Compliant

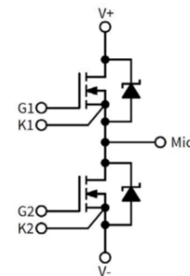
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Motor drive
- Electrified vehicle traction inverter
- Photovoltaics, wind power generation
- Induction heating equipment

Equivalent Circuit Schematic



Maximum Ratings (T_c = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1200	V		
V_{GSmax}	Gate - Source Voltage	-8/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	200 160	A	V_{GS}=20V , T_{VJ} = 25°C V_{GS}=20V , T_{VJ} = 150°C	
$I_{D,peak}$	Repetitive peak drain current	600	A	Pulsed Drain Current, t_P limited by Tjmax	
T_{VJ} , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	°C		
V_{ISO}	Isolation Test Voltage	4200		AC，50Hz，1 min.	

Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	V_{GS}=0V, I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.50	4.0	V	V_{GS}= V_{DS}, I_{DS}=100mA,T_{VJ} = 25°C	
			1.80			V_{GS}= V_{DS}, I_{DS}=100mA,T_{VJ} = 150°C	
I_{DSS}	Zero Gate Voltage Drain Current		32	240	μA	V_{DS}= 1200V, V_{GS}=0V	
I_{GSS}	Gate-Source Leakage Current		80	360	nA	V_{GS}= 20 V, V_{DS}= 0V	
$R_{DS(on)}$	Drain-Source on-state Resistance		4.75	5.25	mΩ	V_{GS}= 20 V, I_D=200A, T_{VJ} =25°C	
			6.42		mΩ	V_{GS}= 20 V, I_D=200A, T_{VJ} =150°C	
Ciss	Input Capacitance		19.4		nF	V_{GS}=0V, V_{DS}=800 V, f=1MHz, V_{AC}=25 mV	
Coss	Output Capacitance		118				
Crss	Reverse Transfer Capacitance		0.95				
E_{ON}	Turn-On Switching Energy		14.8		mJ	V_{DS}=800V, V_{GS}=-5/20V, I_D= 200A, $R_{G(ext)}$ = 5Ω, L= 80 μH, di/dt = 4 kA/μs	
E_{OFF}	Turn-Off Switching Energy		13.5				
$t_{d(on)}$	Turn-On Delay Time		61		ns	V_{DS}=800V, V_{GS}=-5/20 V I_D = 200A, $R_{G(ext)}$ = 5 Ω ,	
t_r	Rise Time		57				
$t_{d(off)}$	Turn-Off Delay Time		205				
t_f	Fall Time		46				
Q_{gs}	Gate to Source Charge		228		nC	V_{DS}=800V, V_{GS}=-5/20 VI_D = 200A	
Q_{gd}	Gate to Drain Charge		315				
Q_g	Total Gate Charge		950				

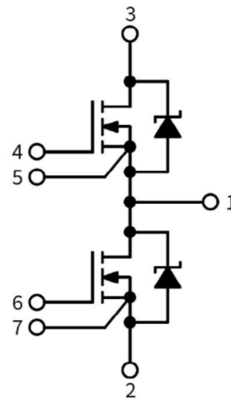
Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.7		V	V_{GS} = -5V, I_{SD} = 160 A, T_{VJ} = 25 °C	
		3.4		V	V_{GS} = -5V, I_{SD} = 160 A, T_{VJ} = 150 °C	
I_S	Continuous Diode Forward Current		200	A	V_{GS} = -5V,T_{VJ} = 25°C	
			180	A	V_{GS} = -5V,T_{VJ} = 150°C	
I_{rrm}	Peak reverse recovery current		200	A	V_{GS} = -5V, I_{SD} = 160 A, $V_{R,DS}$=800V, T_{VJ} = 25 °C	
			340	A	V_{GS} = -5V, I_{SD} = 160 A, $V_{R,DS}$=800V, T_{VJ} = 150 °C	
Q_{rr}	Reverse recovery charge		13.8	nC	V_{GS} = -5V, I_{SD} = 160 A, $V_{R,DS}$=800V, T_{VJ} = 25 °C	
			26.1	nC	V_{GS} = -5V, I_{SD} = 160 A, $V_{R,DS}$=800V, T_{VJ} = 150 °C	

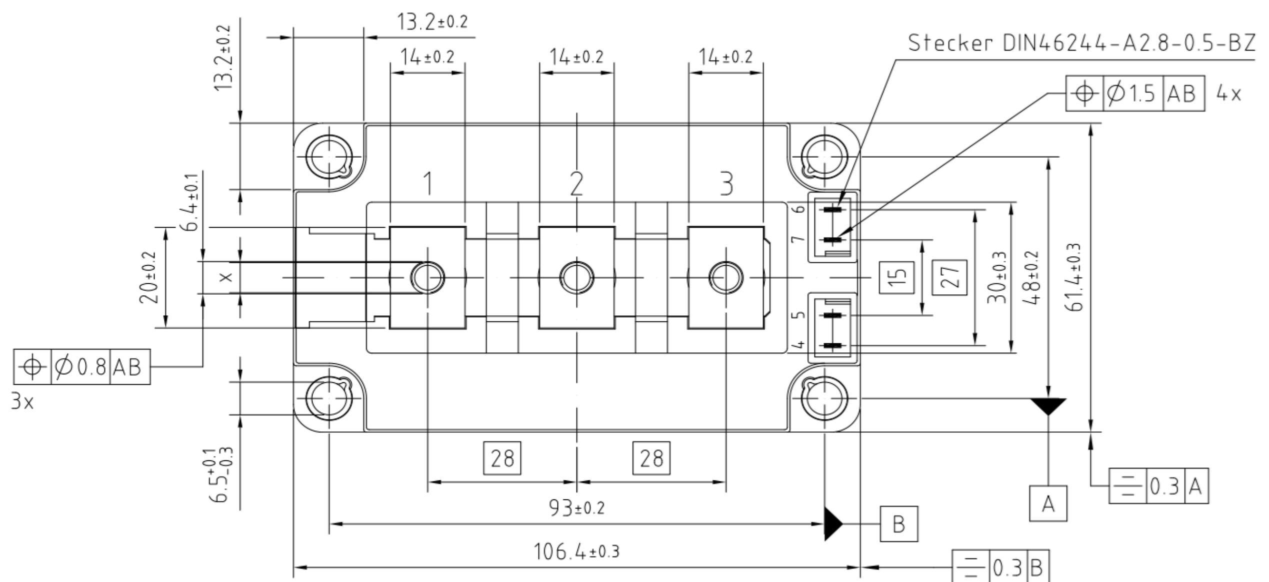
Package Characteristics

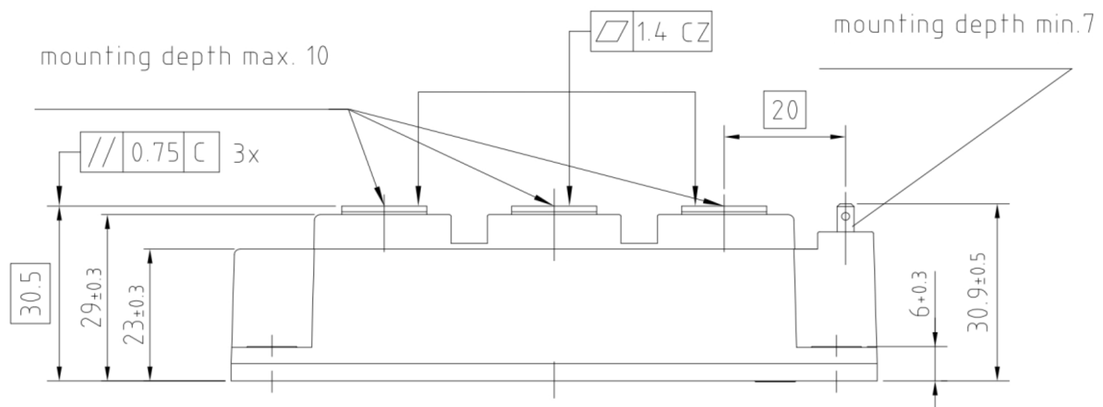
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$L_{s,DS}$	Stray inductance of module		10.5		nH	T_C = 25°C	
M_C	Mounting torque for module mounting	4.0	5.0	6.0	Nm	Screw M6 baseplate to heatsink	
M_T	Mounting torque for module power terminal	3.0	4.0	5.0	Nm	Screw M6 power terminal to bus bar	
W_P	Weight		320		g		

Circuit Schematic



Package Dimension




mounting depth max. 10
1.4 CZ
mounting depth min.7
20
0.75 C 3x
30.5
29±0.3
23±0.3
6+0.3
30.9±0.5